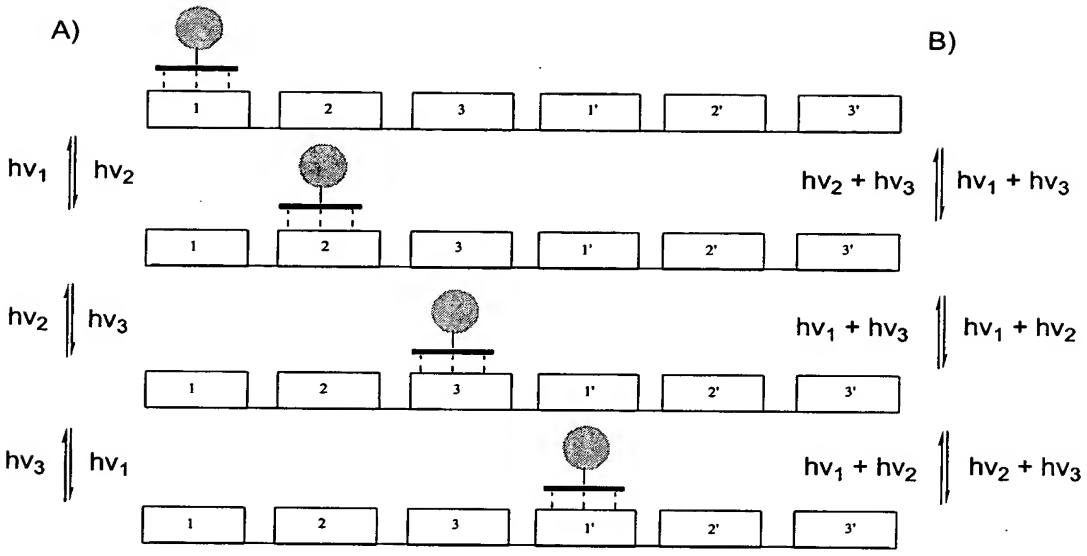

A)
B)
1
2
3
1'
2'
3'
hv1
hv2
hv2 + hv3
hv1 + hv3
hv2
hv3
hv1 + hv3
hv1 + hv2
hv3
hv1
hv1 + hv2
hv2 + hv3

FIG. 1

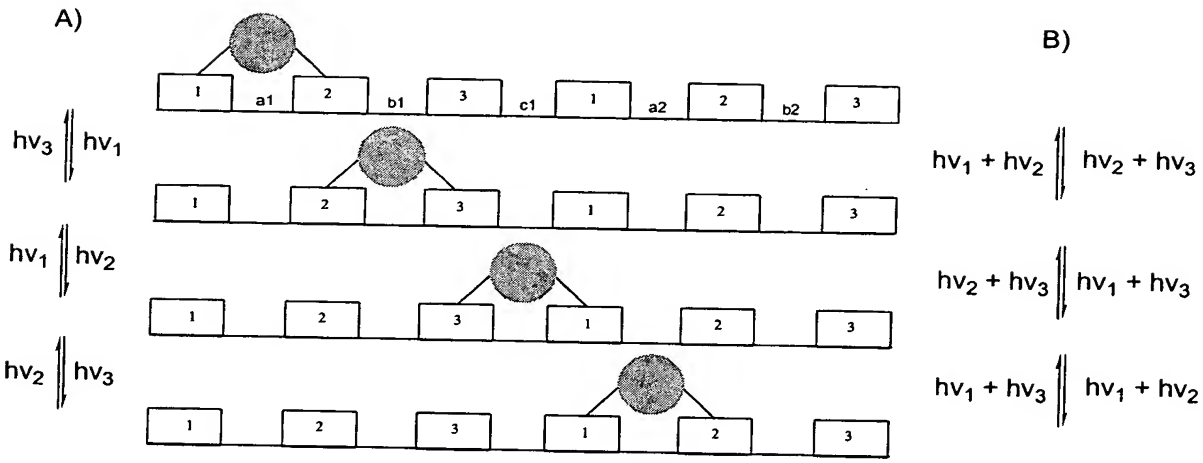

A)
B)
1
a1
2
b1
3
c1
1
a2
2
b2
3
hv3 hv1
hv1 hv2
hv2 hv3
hv1 + hv2 hv2 + hv3
hv2 + hv3 hv1 + hv3
hv1 + hv3 hv1 + hv2

FIG. 2

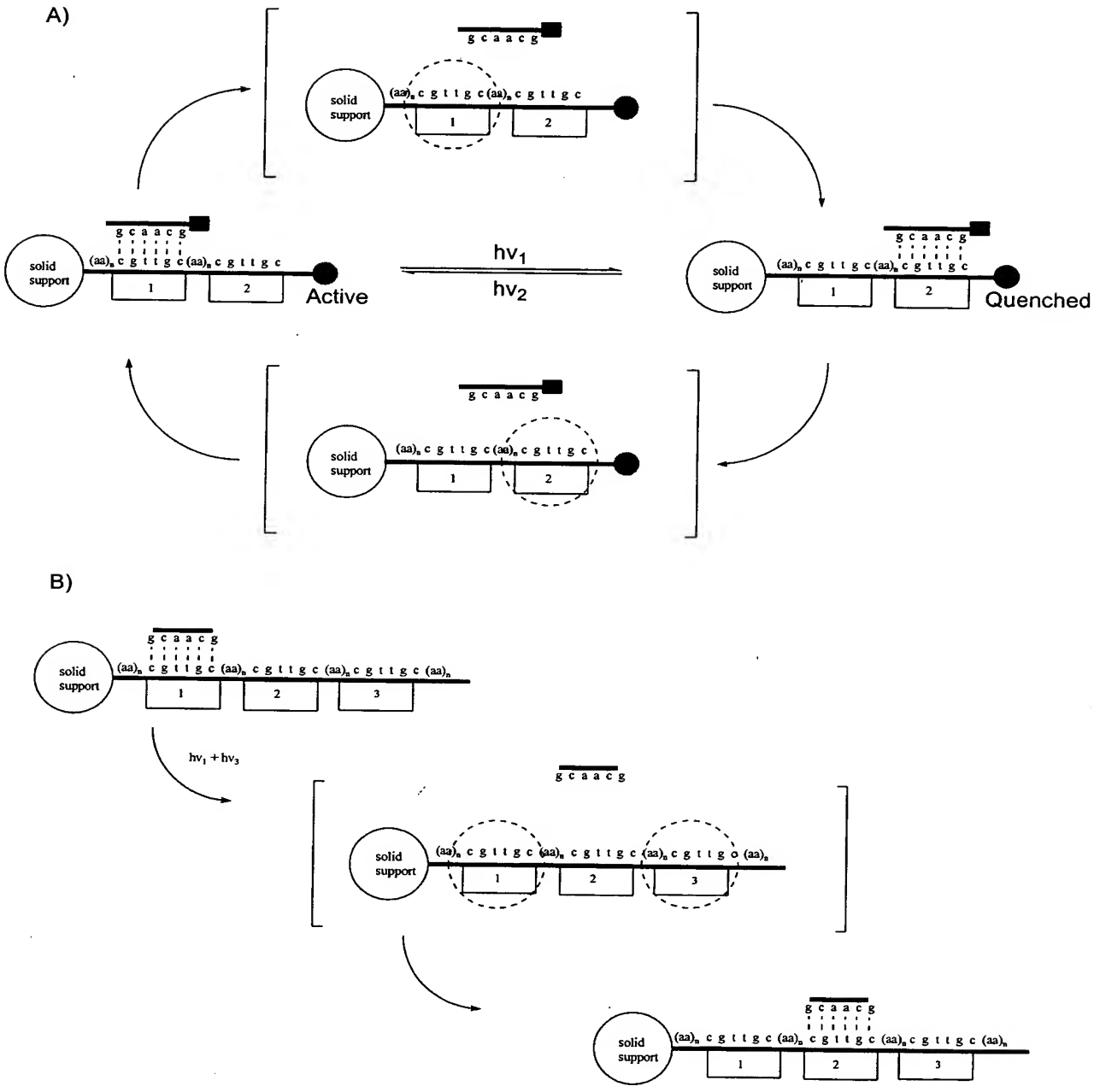


FIG. 3

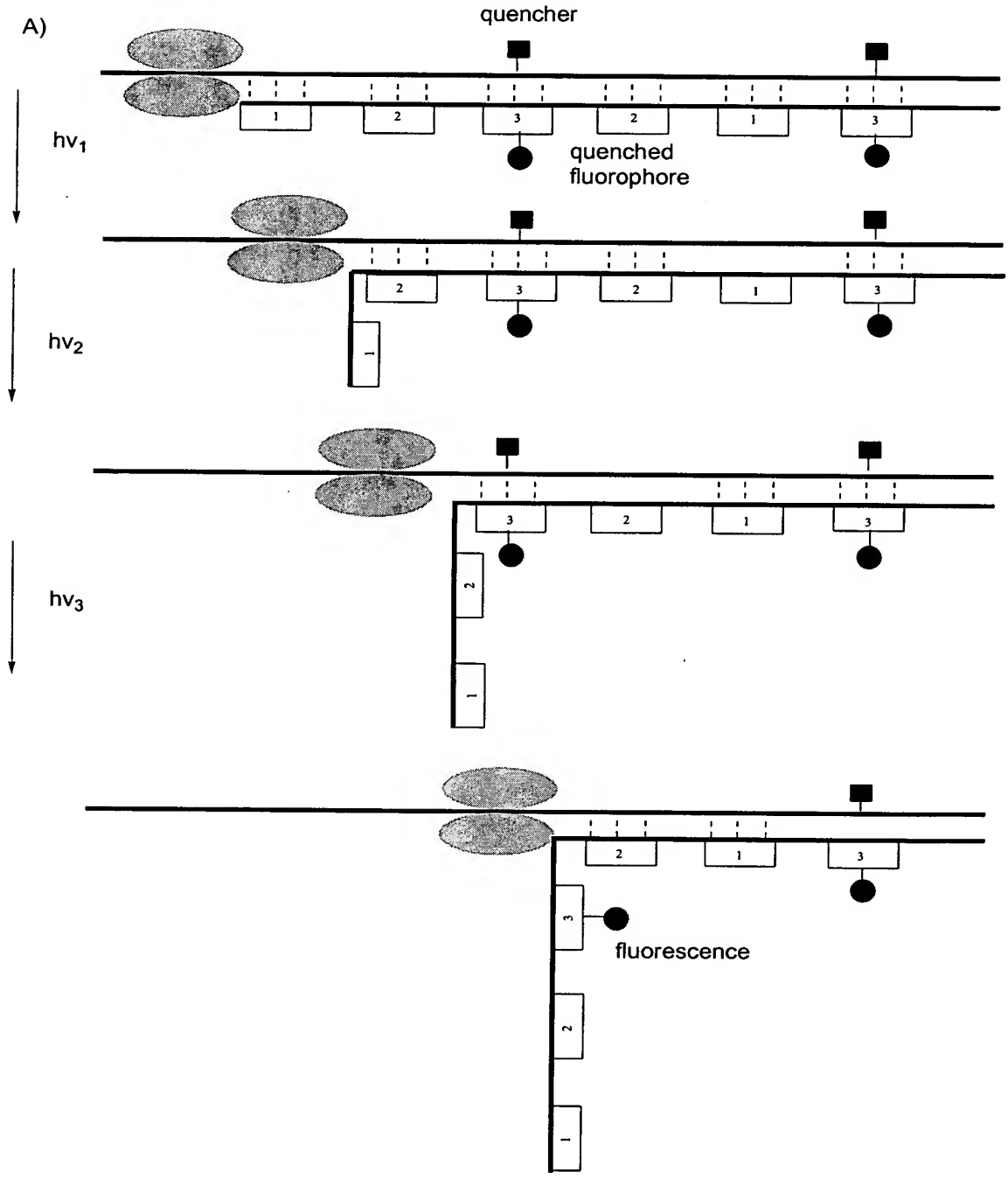


FIG. 4a

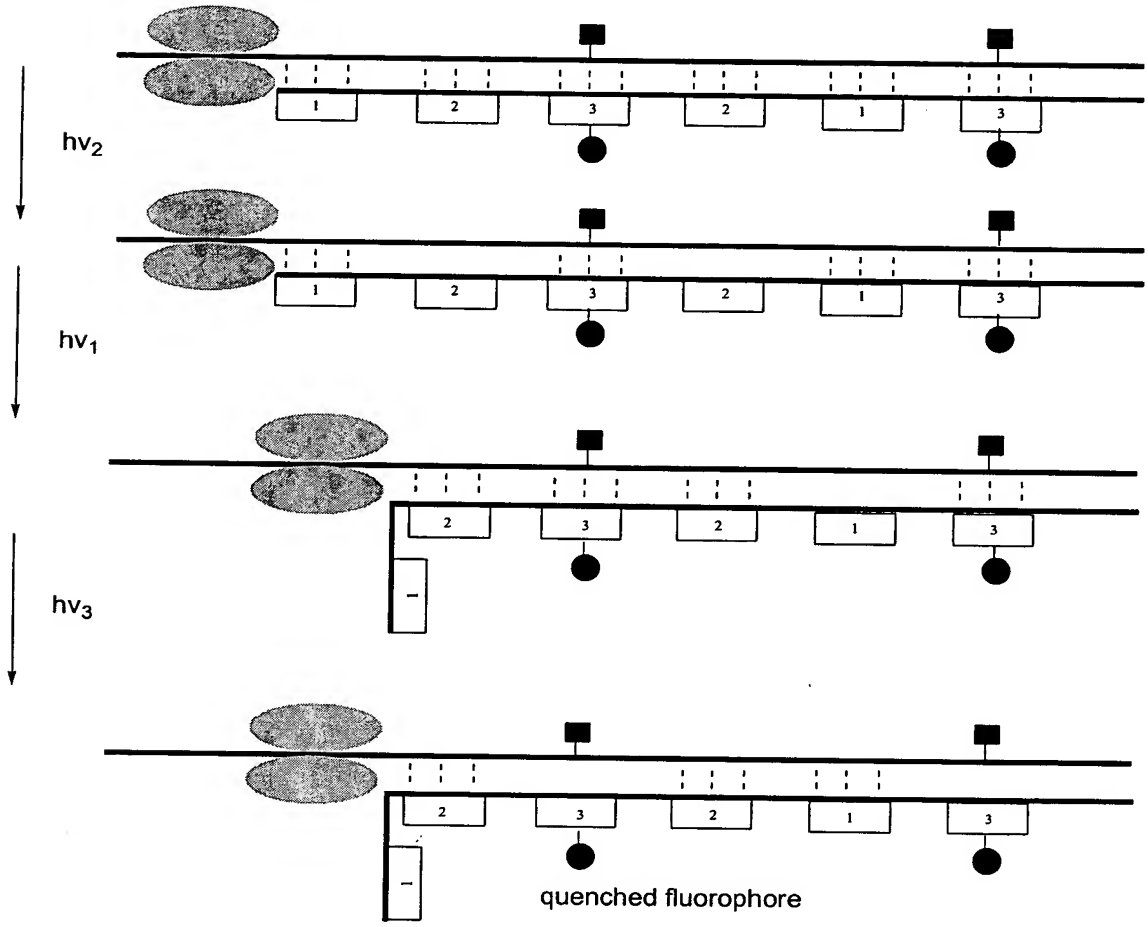


FIG. 4b

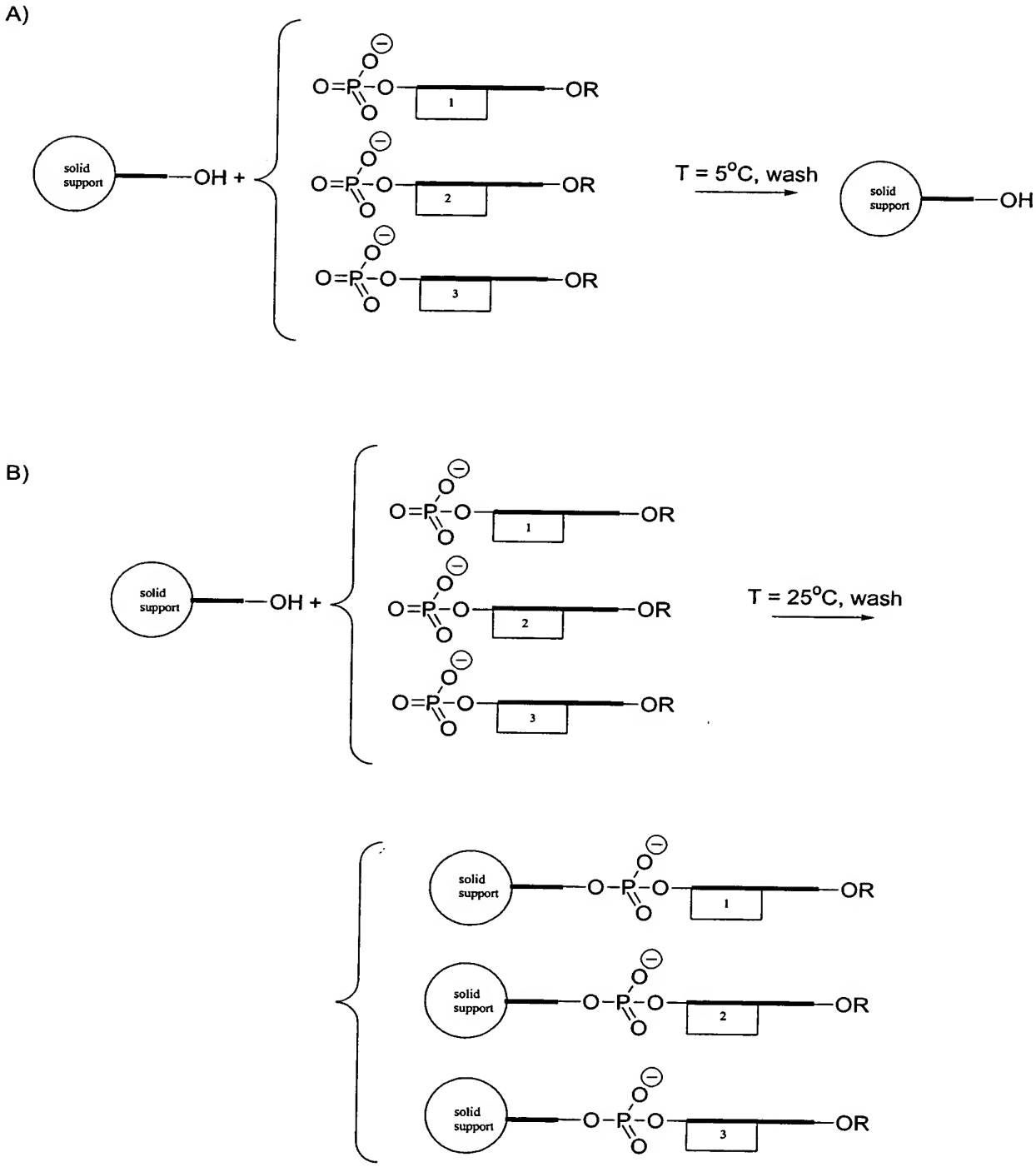


FIG. 5 a and b

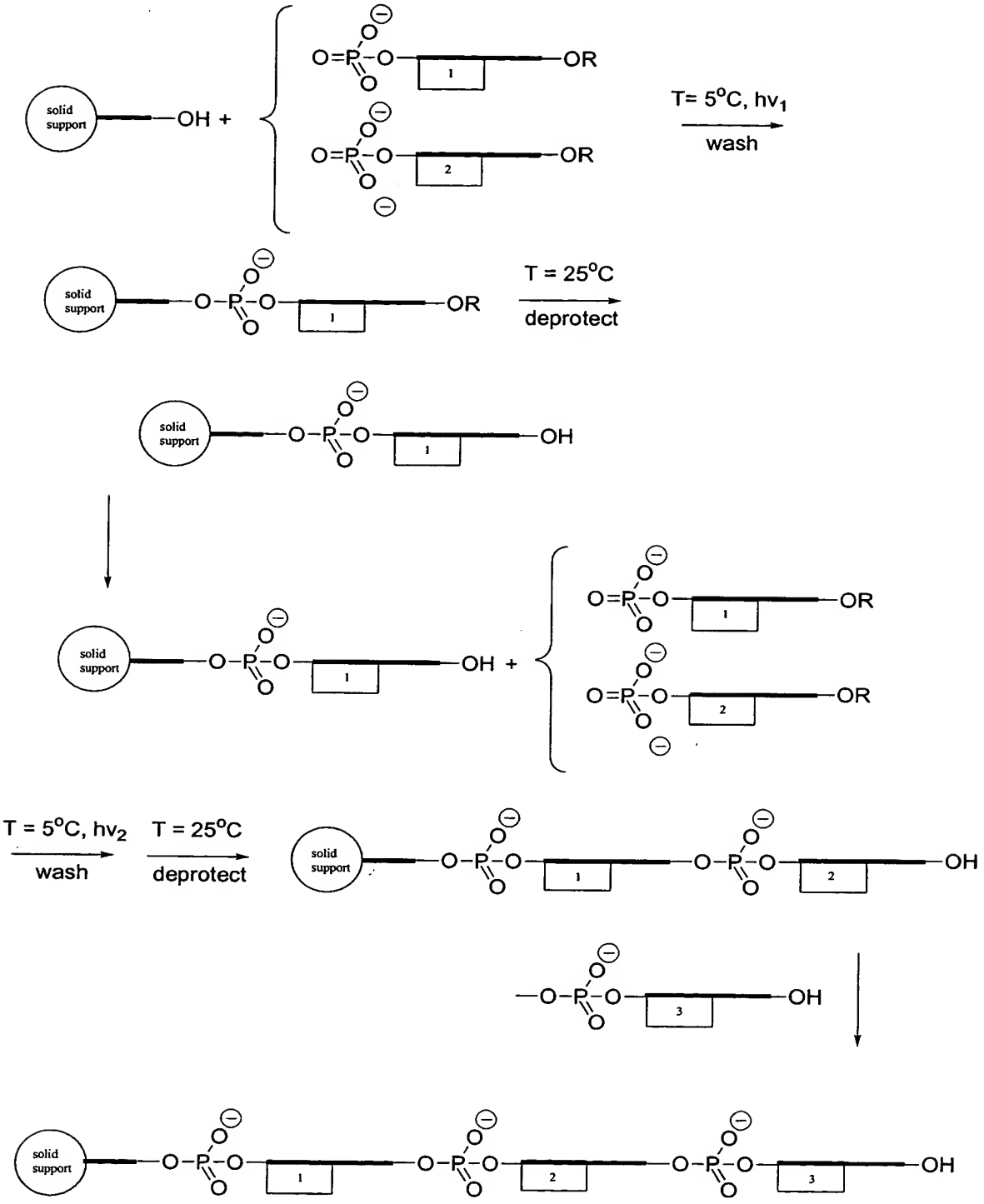

solid support
OH +
OR
T= 5°C, hv1
wash
T = 25°C
deprotect
T = 5°C, hv2
T = 25°C
wash
deprotect
1
2
3

FIG. 5c

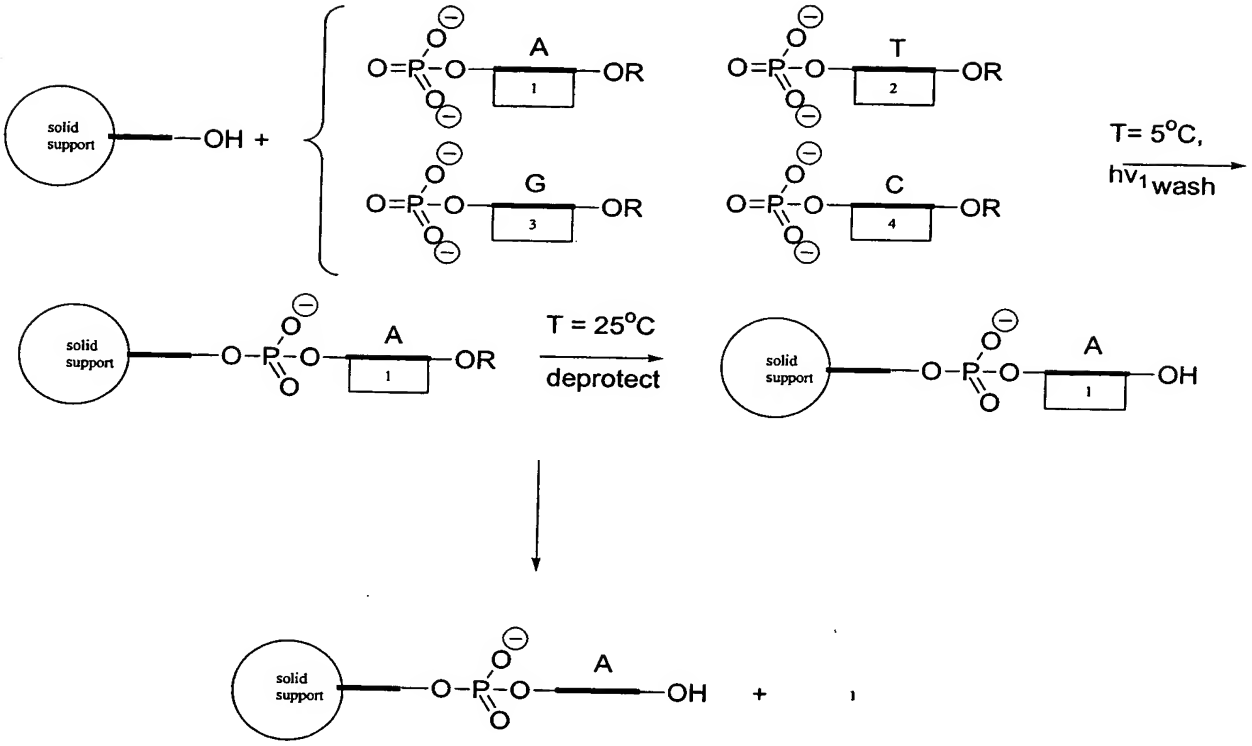


FIG. 5d

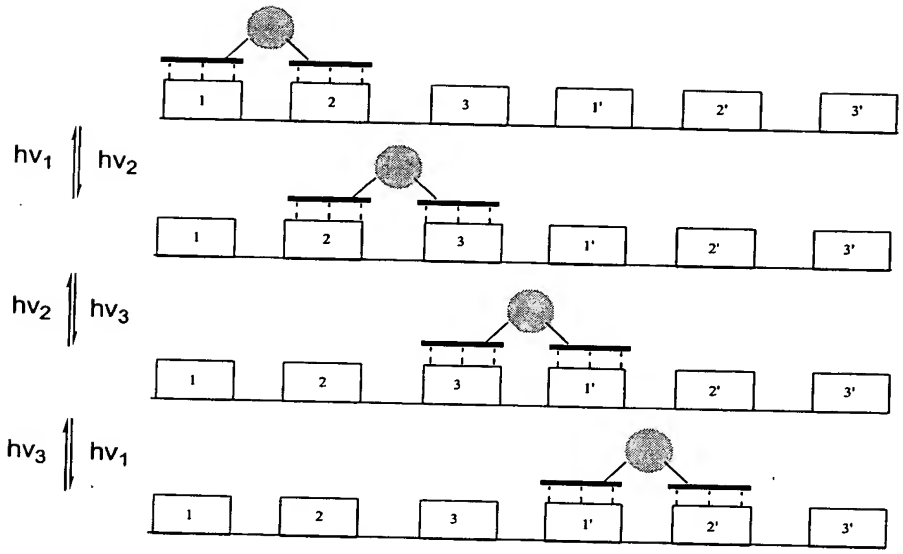


FIG. 6

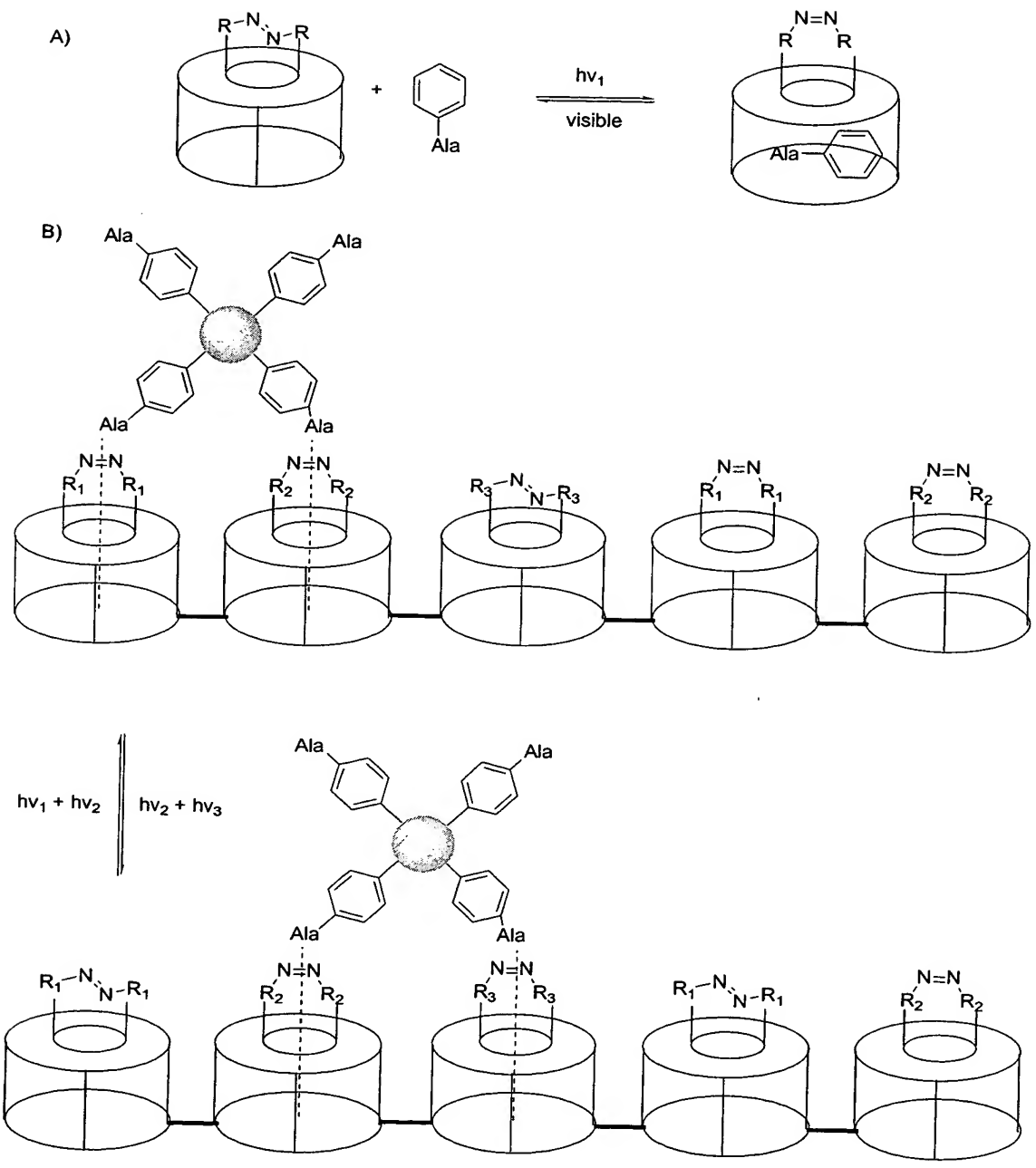


FIG. 7

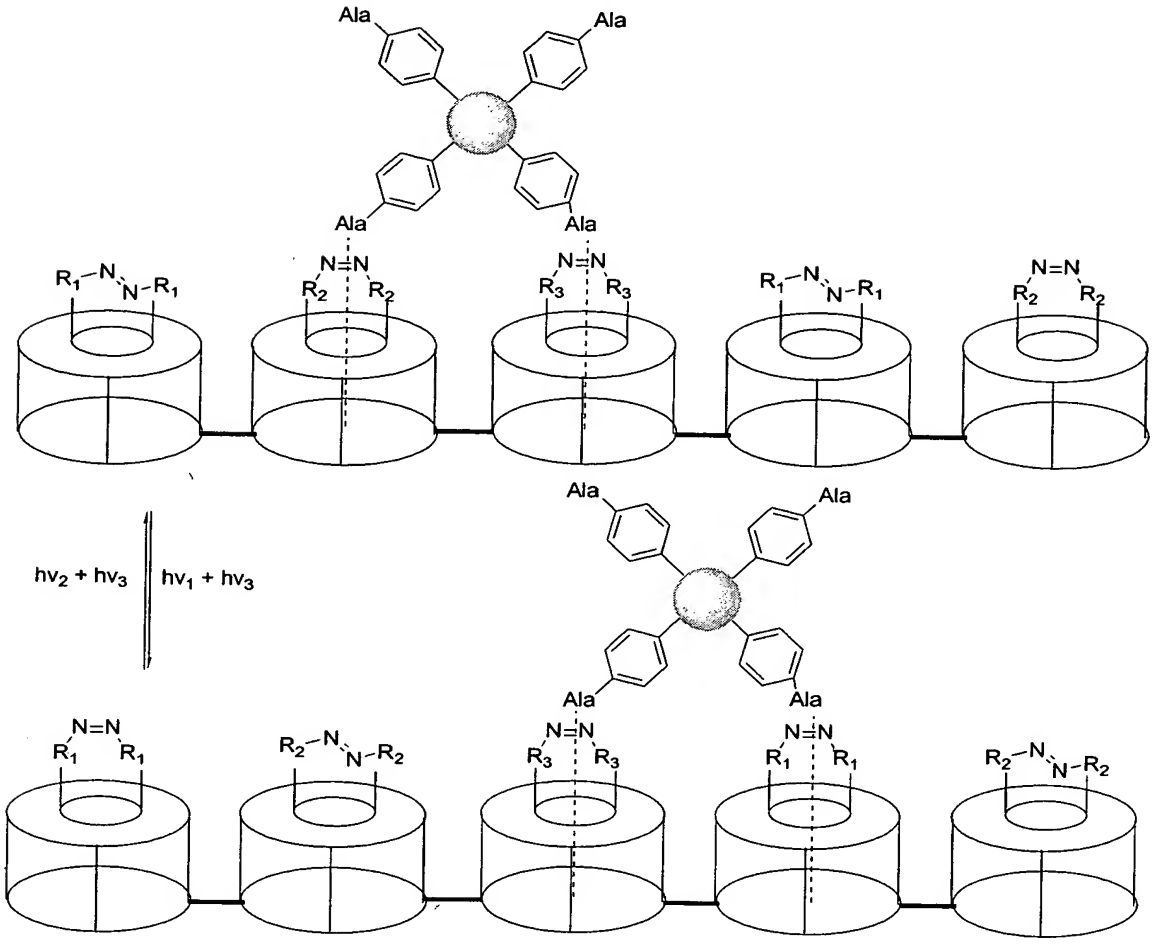

Ala
Ala
Ala
Ala
R_1 N N R_1
N=N R_2 R_2
N=N R_3 R_3
R_1 N N R_1
N=N R_2 R_2
$hv_2 + hv_3$
$hv_1 + hv_3$
Ala
Ala
Ala
Ala
N=N R_1 R_1
R_2 N N R_2
N=N R_3 R_3
N=N R_1 R_1
R_2 N N R_2

FIG. 7

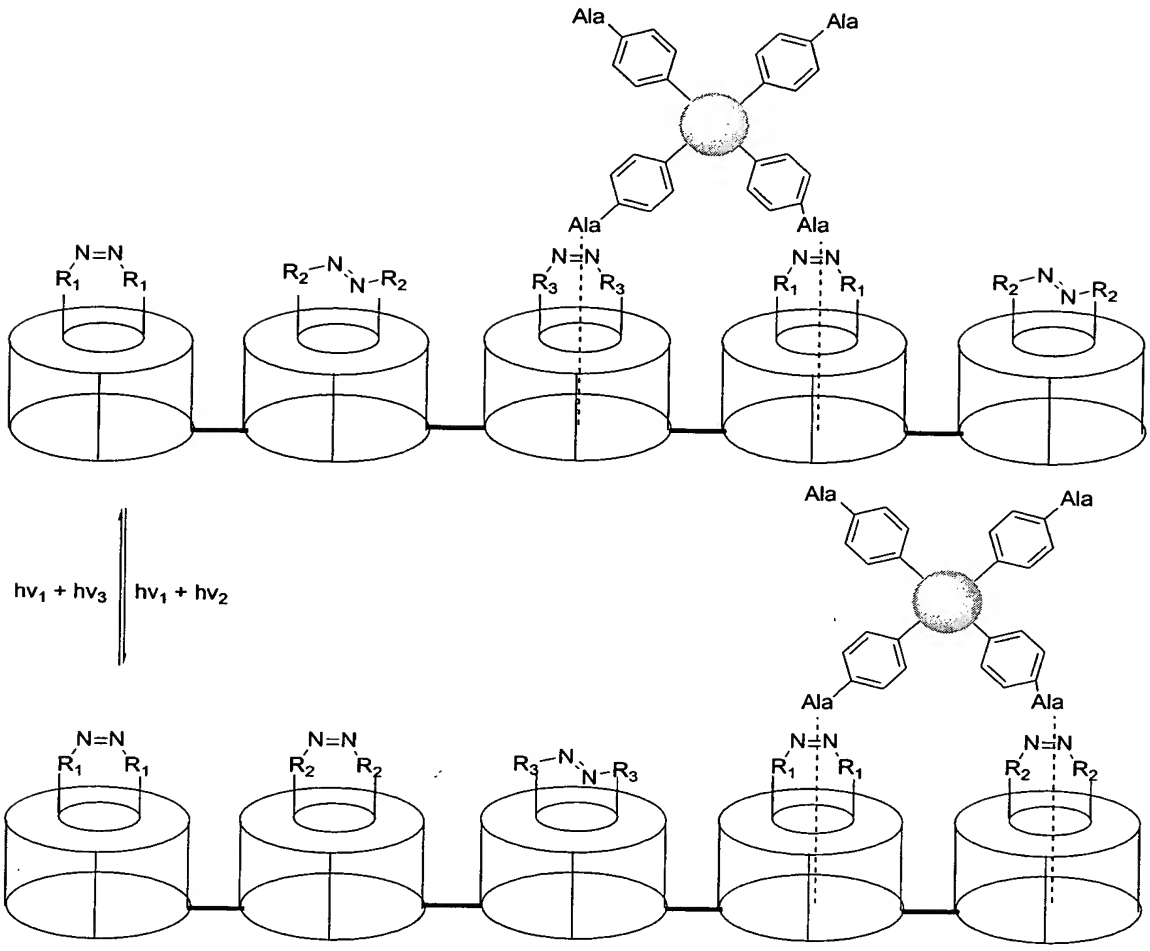

Ala
Ala
Ala
Ala
N=N
R1
R1
R2
N
N
R2
N=N
R3
R3
N=N
R1
R1
R2
N
N
R2
hv1 + hv3
hv1 + hv2
Ala
Ala
Ala
Ala
N=N
R1
R1
N=N
R2
R2
R3
N
N
R3
N=N
R1
R1
N=N
R2
R2

FIG. 7

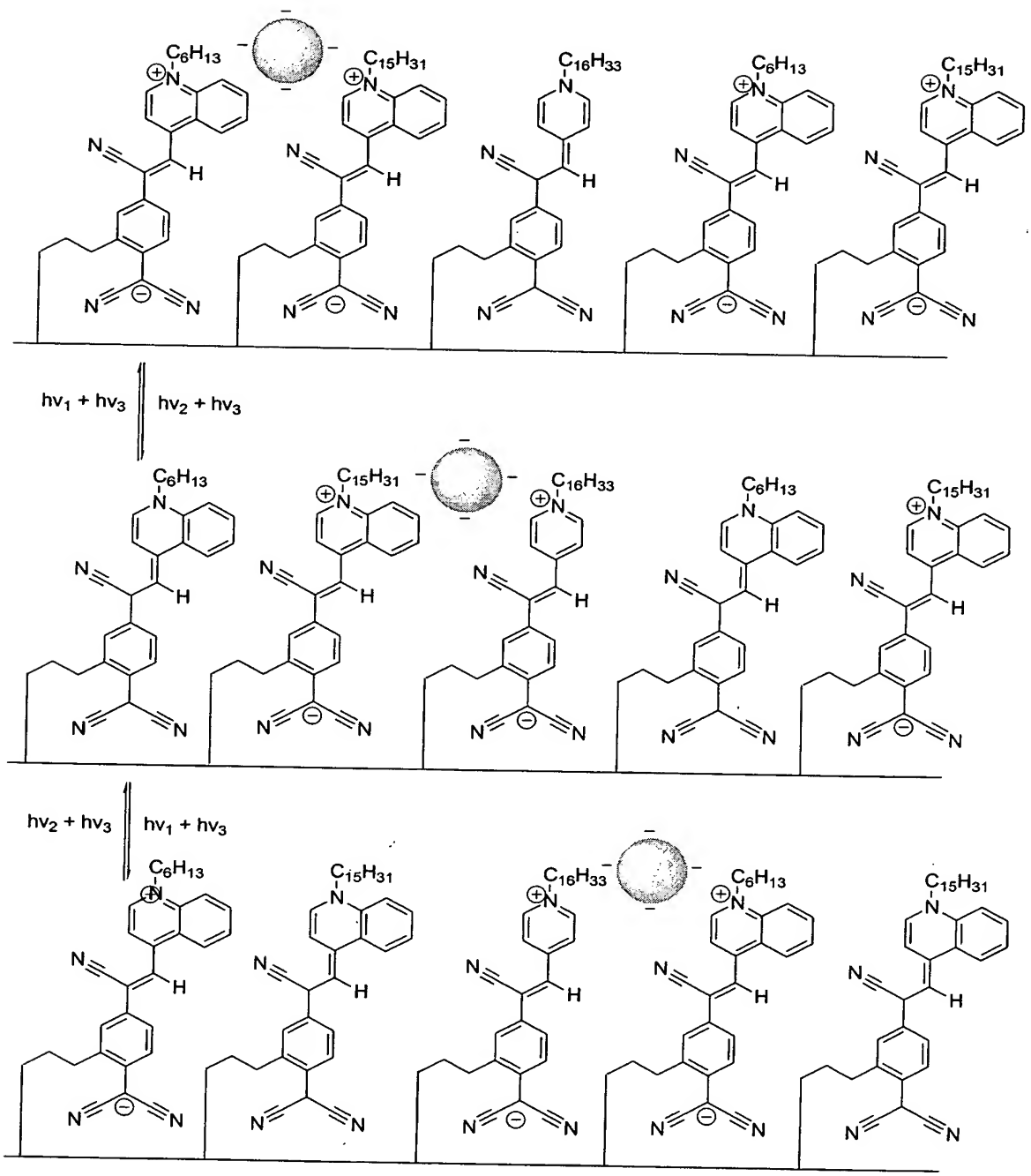


FIG. 8

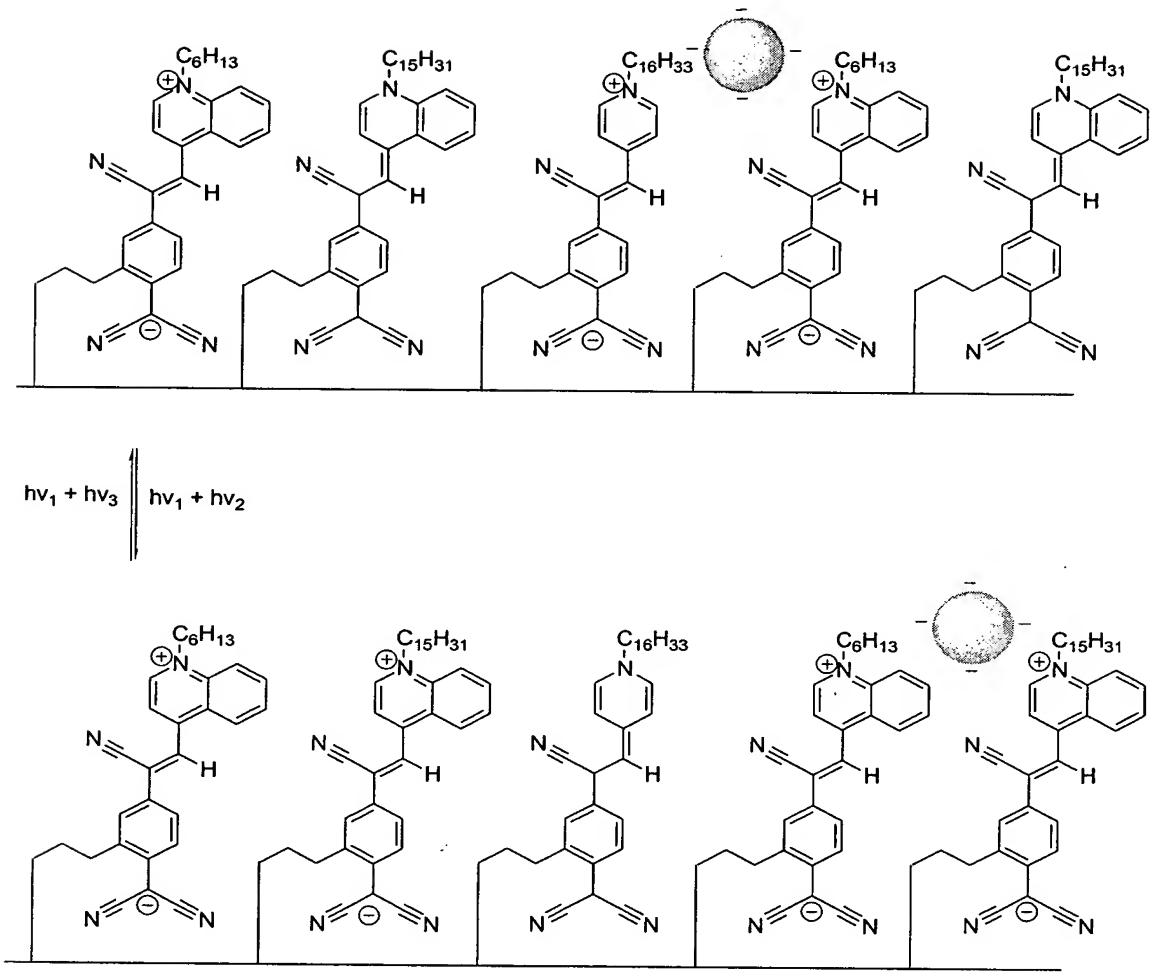

C_6H_{13}
$C_{15}H_{31}$
$C_{16}H_{33}$
C_6H_{13}
$C_{15}H_{31}$
$hv_1 + hv_3$
$hv_1 + hv_2$
C_6H_{13}
$C_{15}H_{31}$
$C_{16}H_{33}$
C_6H_{13}
$C_{15}H_{31}$

FIG. 8

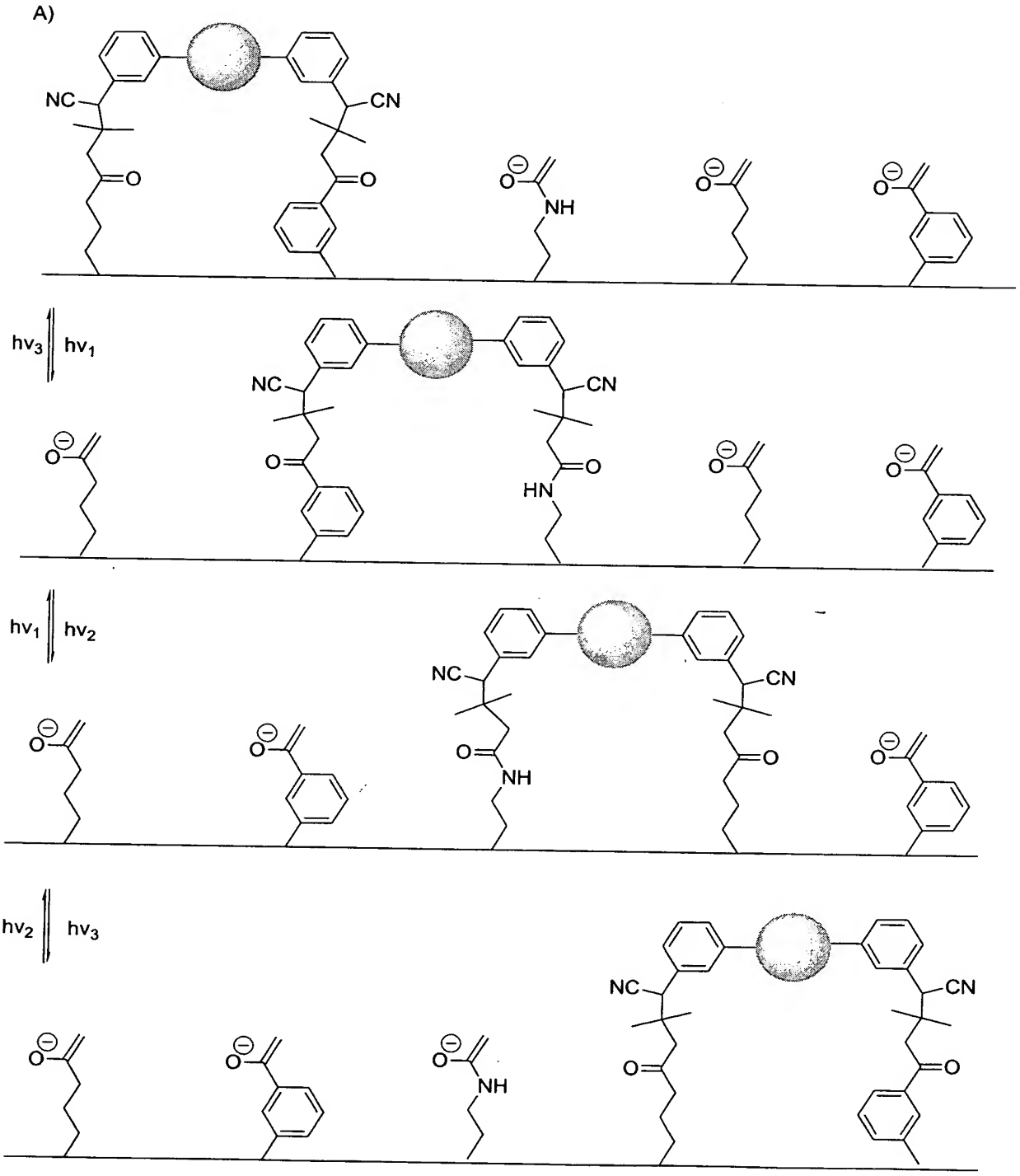


FIG. 9a

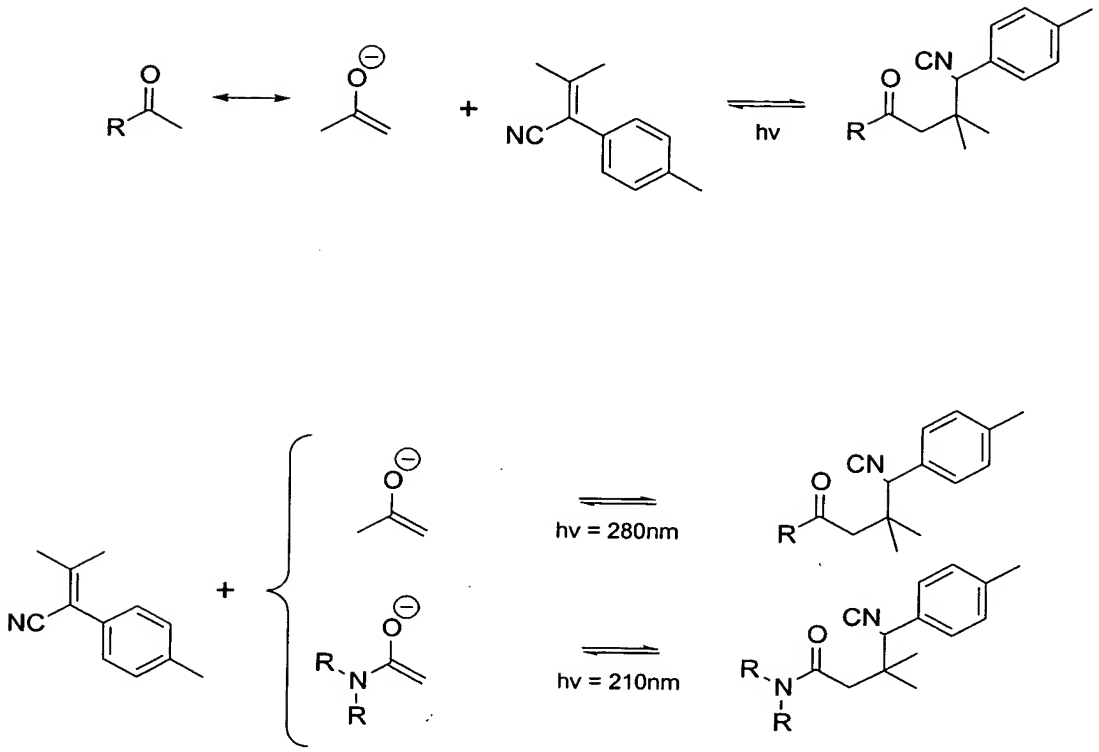


FIG. 9b

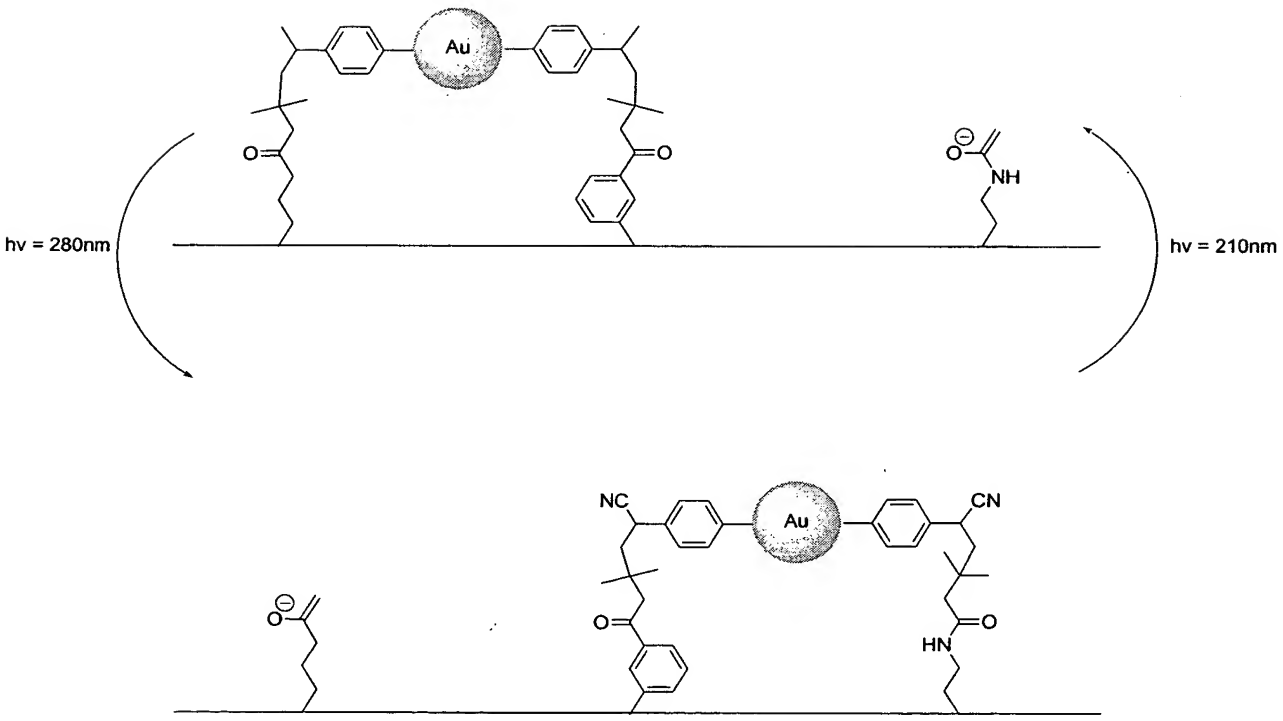


FIG. 9c

A)

Functionality of protein-DNA interaction versus pH conditions

Protein	Acid	Neutral	Base
1	Active	Inactive	Inactive
2	Inactive	Active	Inactive
3	Inactive	Inactive	Active

B)

Functionality of protein-DNA interactions versus pH conditions for protein combinations

Protein combination	Acid	Neutral	Base
1 + 2	Active	Active	Inactive
1 + 3	Active	Inactive	Active
2 + 3	Inactive	Active	Active

FIG. 10 a and b

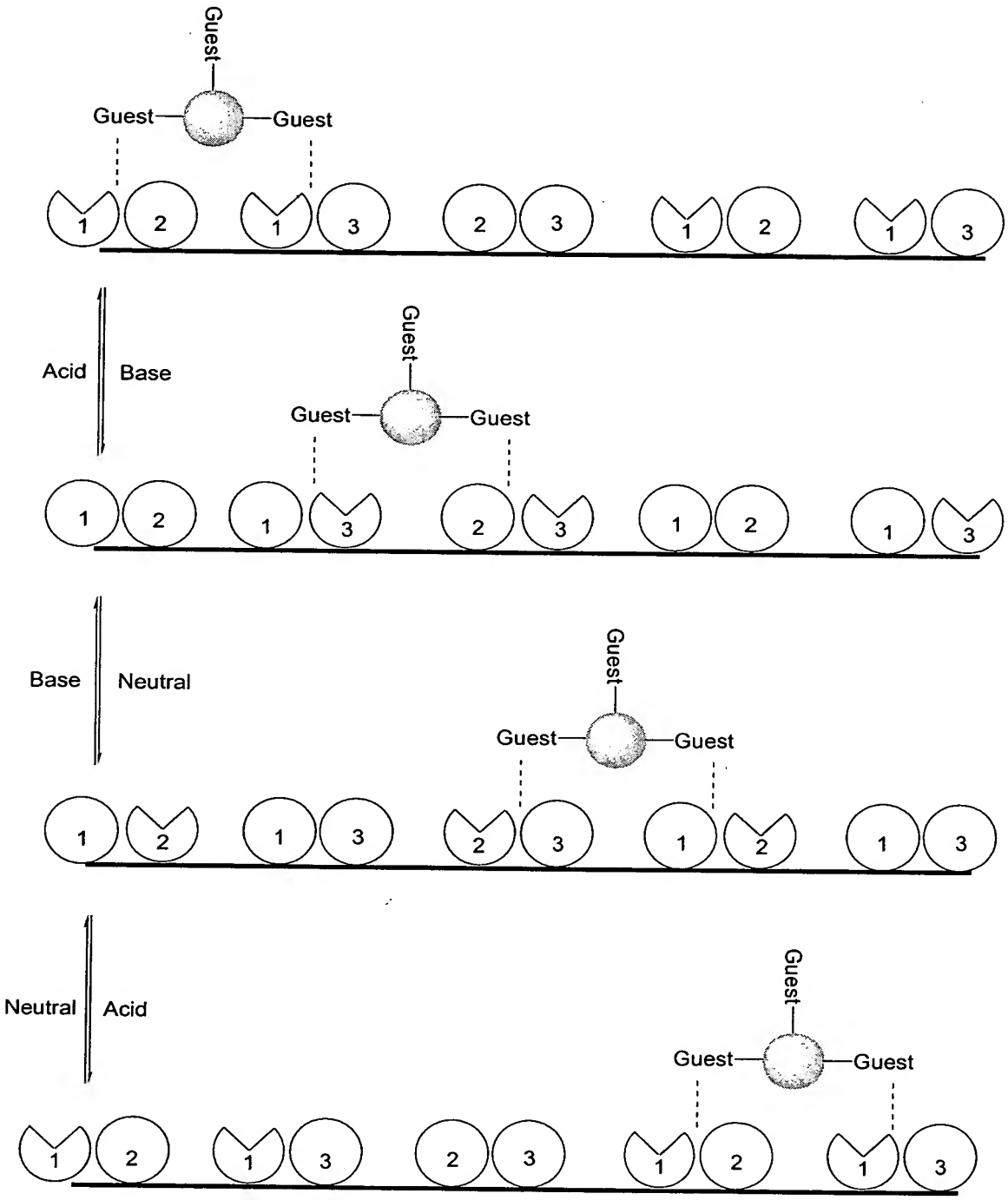

Guest
Guest
Guest
1
2
1
3
2
3
1
2
1
3
Acid
Base
Guest
Guest
Guest
1
2
1
3
2
3
1
2
1
3
Base
Neutral
Guest
Guest
Guest
1
2
1
3
2
3
1
2
1
3
Neutral
Acid
Guest
Guest
Guest
1
2
1
3
2
3
1
2
1
3

FIG. 10c

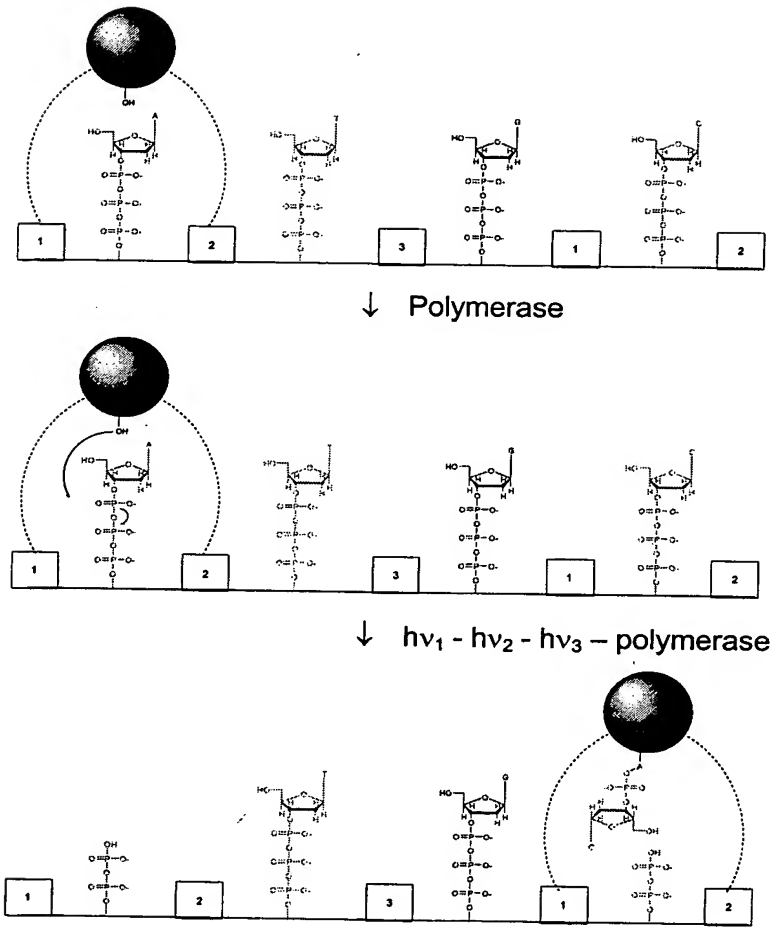
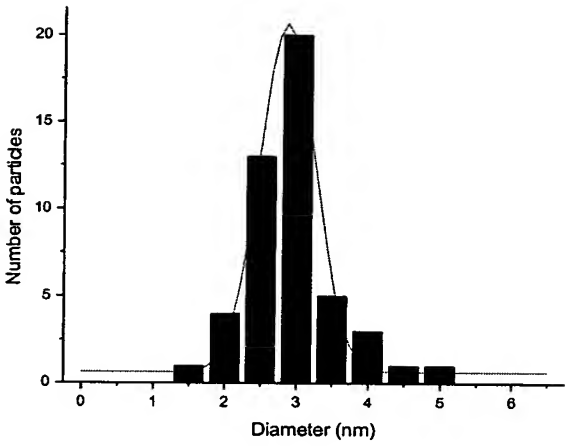
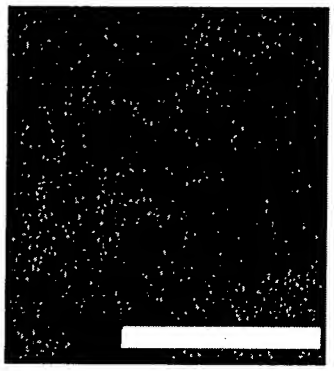


FIG. 11

a)



b)



c)

FIG. 12

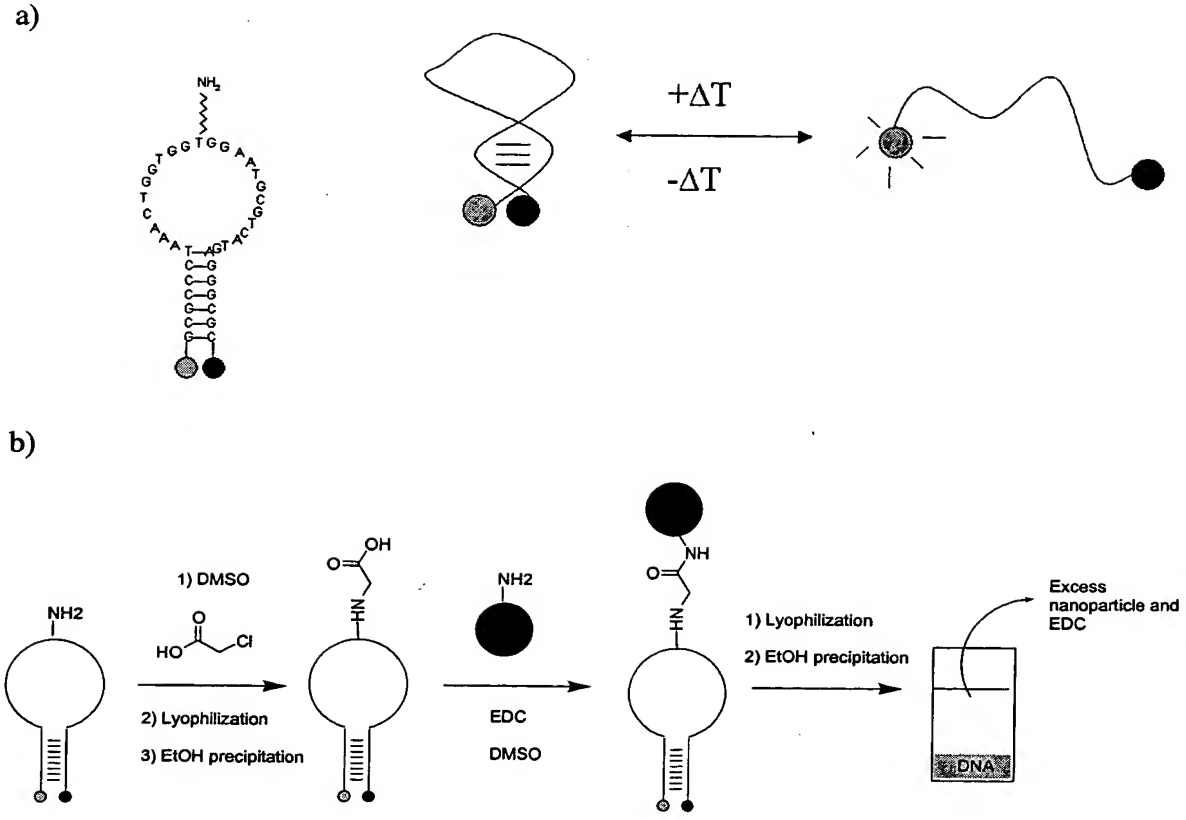

a)
+ΔT
-ΔT
b)
NH2
1) DMSO
HO
Cl
2) Lyophilization
3) EtOH precipitation
OH
NH2
EDC
DMSO
NH
1) Lyophilization
2) EtOH precipitation
Excess nanoparticle and EDC
DNA

FIG. 13

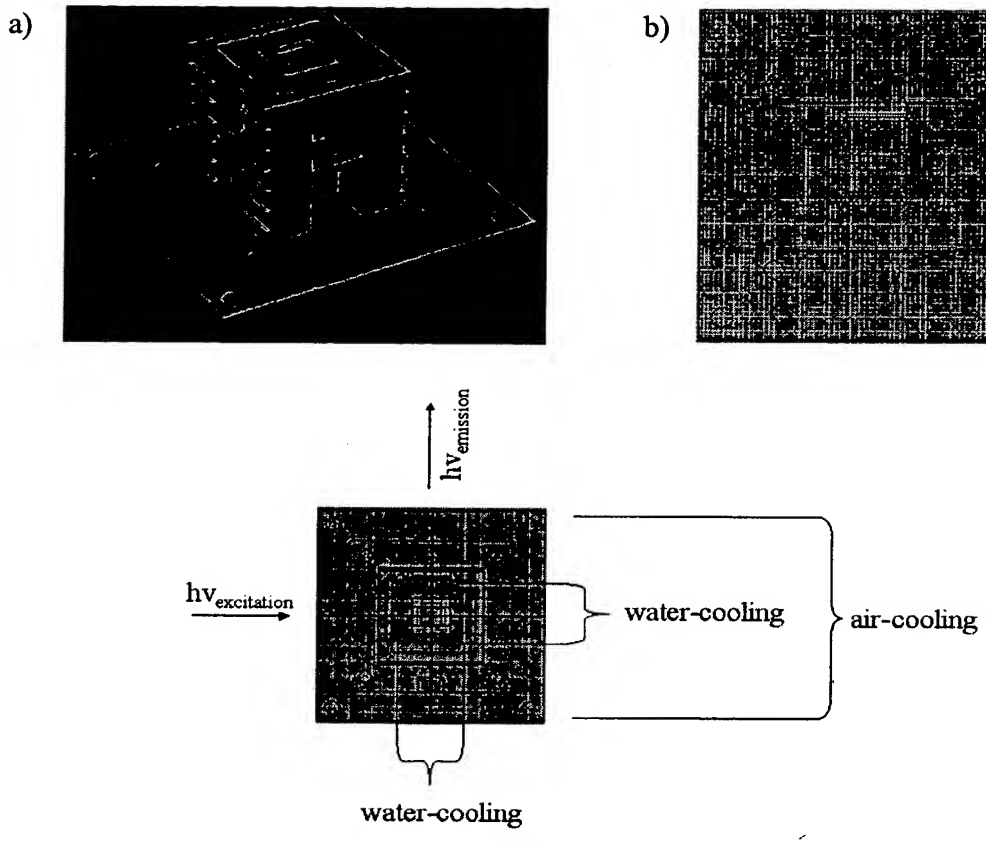

a)
b)
$hv_{emission}$
$hv_{excitation}$
water-cooling
air-cooling
water-cooling

FIG. 14

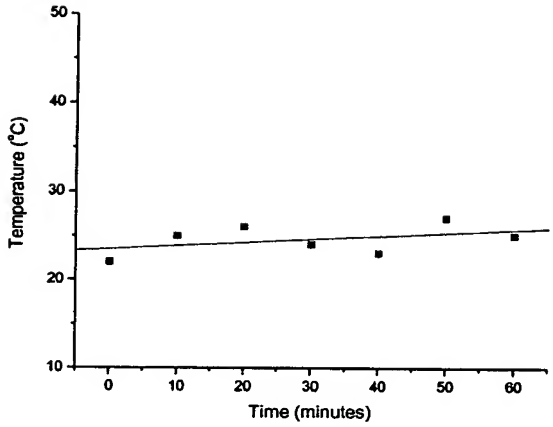


FIG. 15

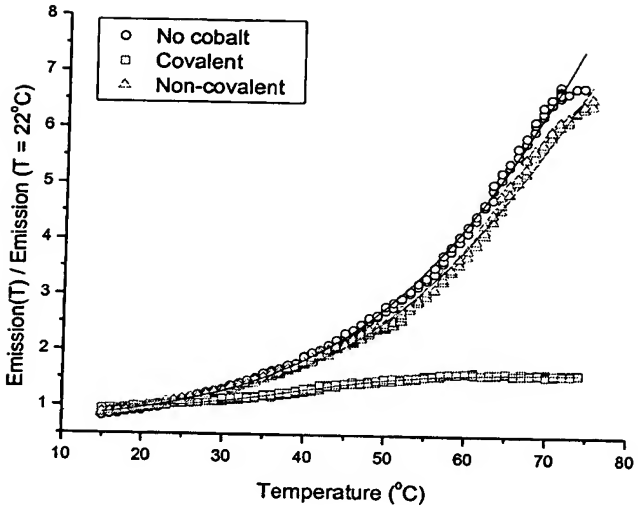
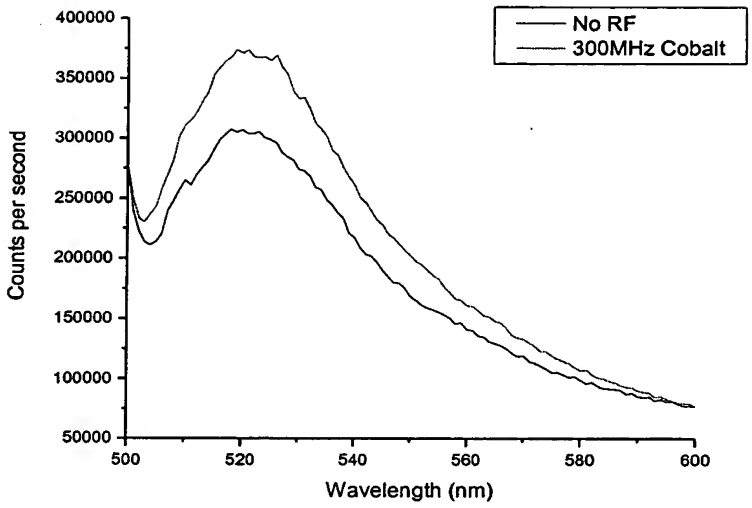

No cobalt
Covalent
Non-covalent
Emission(T) / Emission (T = 22°C)
Temperature (°C)
1
2
3
4
5
6
7
8
10
20
30
40
50
60
70
80

FIG. 16

a)


No RF
300MHz Cobalt
Counts per second
Wavelength (nm)
400000
350000
300000
250000
200000
150000
100000
50000
500
520
540
560
580
600

b)

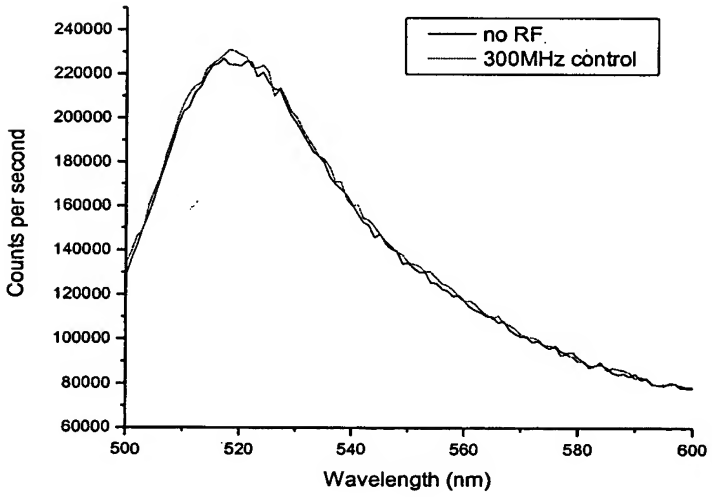
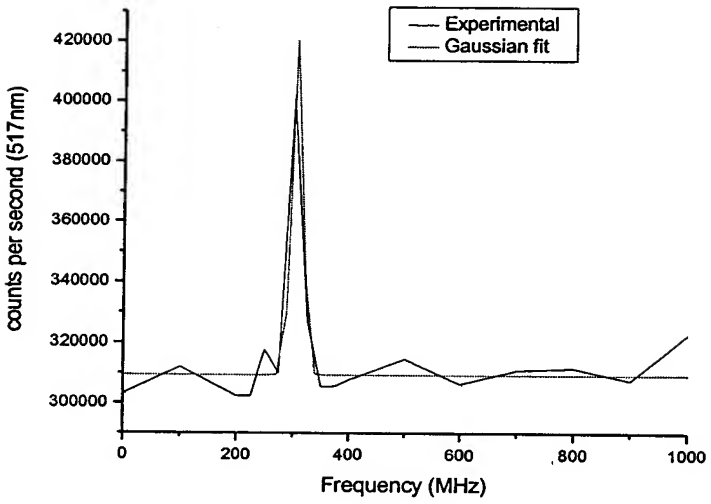

no RF
300MHz control
Counts per second
Wavelength (nm)
240000
220000
200000
180000
160000
140000
120000
100000
80000
60000
500
520
540
560
580
600

FIG. 17

a)


Experimental
Gaussian fit
counts per second (517nm)
420000
400000
380000
360000
340000
320000
300000
0
200
400
600
800
1000
Frequency (MHz)

b)

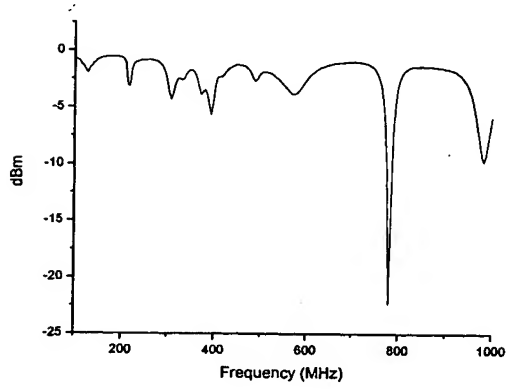
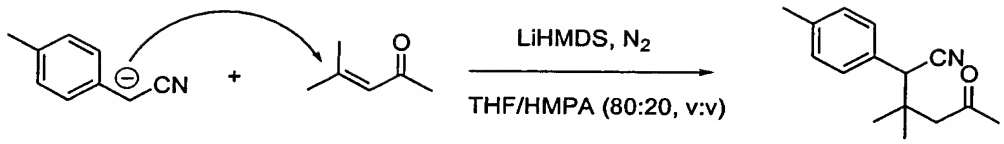

dBm
0
-5
-10
-15
-20
-25
200
400
600
800
1000
Frequency (MHz)

FIG. 18

a)


CN
O
LiHMDS, N_2
THF/HMPA (80:20, v:v)
CN
O

b)

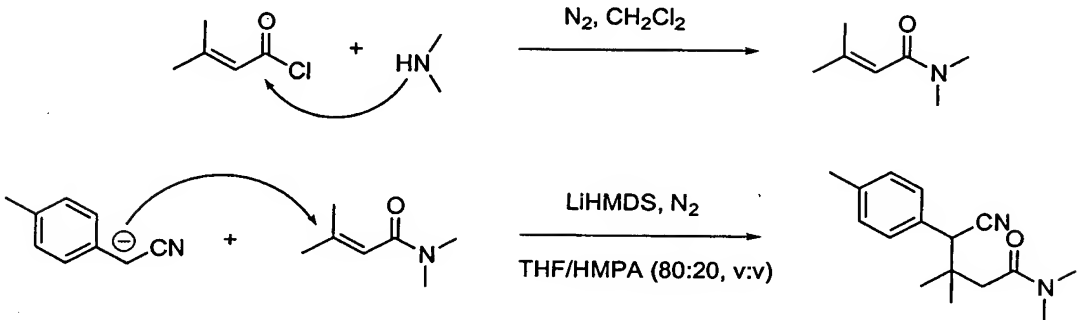
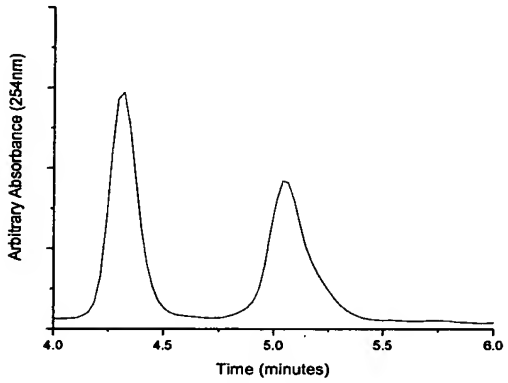

O
Cl
HN
N_2, CH_2Cl_2
O
N
CN
O
N
LiHMDS, N_2
THF/HMPA (80:20, v:v)
CN
O
N

FIG. 19

a) Compound **(X)** ($\lambda > 290$nm)



b) Compound **(Y)** $\lambda = 215$nm

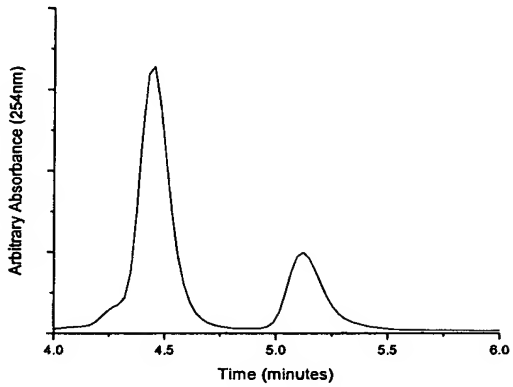
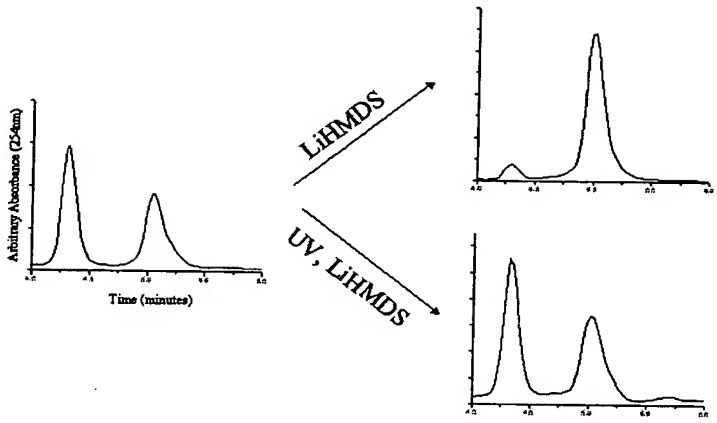


FIG. 20

a) Compound (X)



b) Compound (Y)

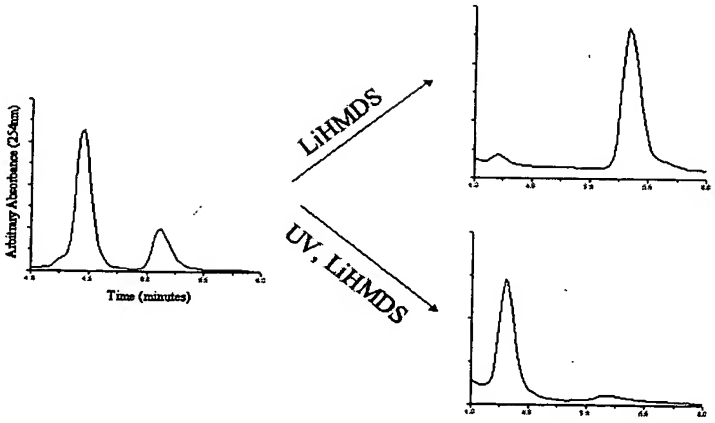


FIG. 21

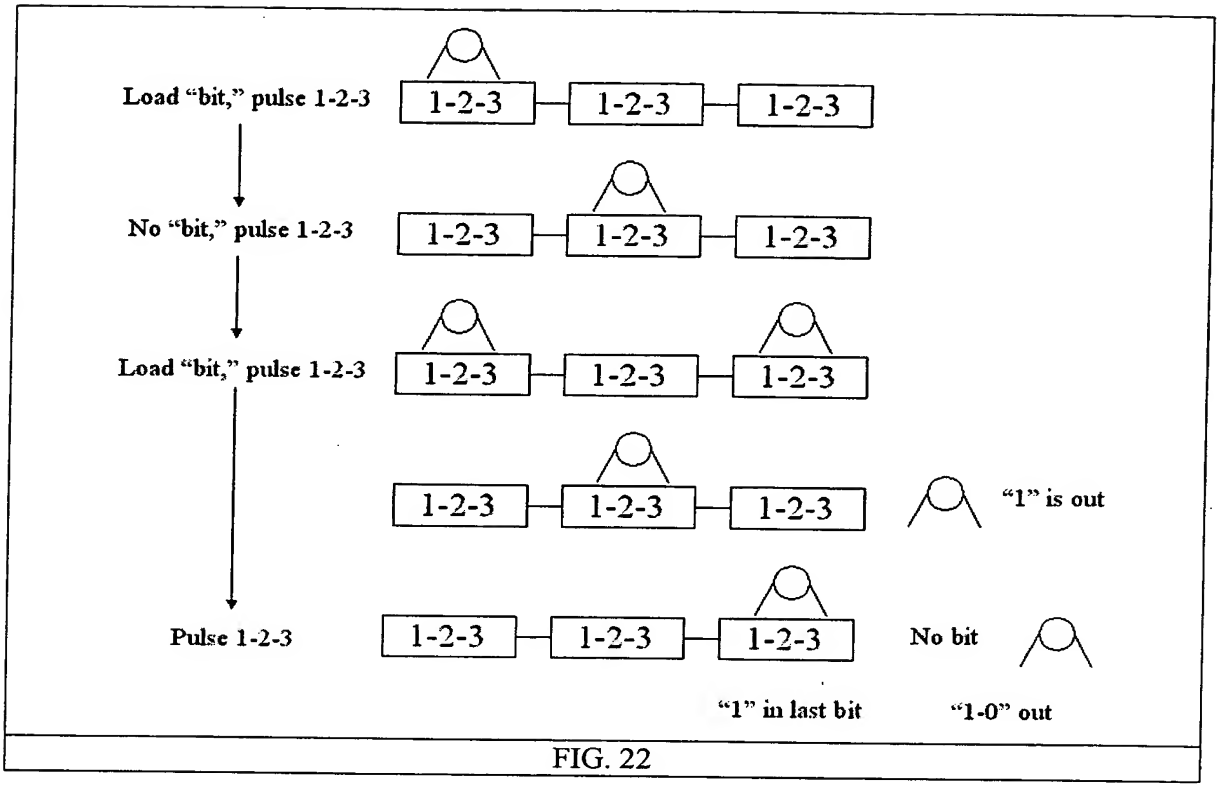

Load "bit," pulse 1-2-3
No "bit," pulse 1-2-3
Load "bit," pulse 1-2-3
Pulse 1-2-3
1-2-3
1-2-3
1-2-3
"1" is out
No bit
"1" in last bit
"1-0" out

FIG. 22